WATER MANAGEMENT IN ALBERTA

CHALLENGES FOR THE FUTURE

BACKGROUND PAPER

VOLUME 10

FLOOD DAMAGE REDUCTION

Alberta
ENVIRONMENT

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SUMMARY

VOLUME 10: FLOOD DAMAGE REDUCTION

CHAPTER 1: FLOOD DAMAGE REDUCTION

Each year, spring breakup and summer rains cause water levels in rivers to rise, threatening many Alberta communities located in river valley settings. Volume ten examines Alberta's flood damage reduction activities and policies.

After floods, various levels of government provide disaster relief to flood victims. However, they can cover only a small portion of the total damages. As well, governments have tried to cope with the problem of flooding by building structures to divert floodwater from areas where damage could occur. This did not provide complete protection. Recently, governments began to shift toward preventive approaches.

On April 3, 1989, Alberta signed an agreement with Canada to enter into the Flood Damage Reduction Program (FDRP). The background paper discusses these main features of the program:

- flood risk mapping and designation
- two zone flood risk mapping
- designation and government policy
- disaster assistance
- municipalities to enact bylaws

Alberta Environment also maintains a flood watch by constantly analyzing information from a network of river stations. A regular program of river ice monitoring to forecast and manage ice jams is another preventive measure.

Although the Minister of Environment under the current ***Water Resources Act*** has the power to declare a certain area as flood control area, these powers were never used in the past to enforce a flood risk area. The background paper discusses the possibility for legislation to require municipalities to pass zoning bylaws to recognize designated flood risk areas.

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TABLE OF CONTENTS

VOLUME 10: FLOOD DAMAGE REDUCTION

Summary

Chapter 1: Flood Damage Reduction 1

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FLOOD DAMAGE REDUCTION

INTRODUCTION

Each year, spring breakup and summer rains cause water levels in rivers to rise, threatening many Alberta communities located in river valley settings.

The most recent major urban flood in the province occurred in the summer of 1988 when the Sawridge Creek in the Town of Slave Lake overflowed its banks causing $12 million damage. Recent major floods have also taken place in Edmonton (1986), Fort McMurray (1977) and Vegreville (1974).

Various levels of government have historically provided disaster relief and assistance to flood victims. Since 1986, the Alberta government has paid out over $50 million in disaster assistance due to floods. However, governments can cover only a small portion of the total damages. In addition to the risk to lives and direct cost from damages to buildings and structures during floods, indirect costs and social disruptions may be extensive. The mental anguish of being flooded and the resulting social disruption of relocation are real but often overlooked aspects of flood susceptibility.

FLOOD DAMAGE REDUCTION STRATEGIES

Alberta Environment is heavily involved in protecting Albertans from the damaging effects of floods. Flood damage reduction has consisted of a combination of 6 components:

- prevention
- land use planning and regulation of development
- protection
- structural measures
- emergency
- flood warning and disaster relief

Until recently, governments have tried to cope with the problem of flooding by building structures to retain flood waters or to divert floodwater away from areas where damage could occur. The Paddle River dam, for example, was built strictly for flood control, while the Dickson Dam on the Red Deer River is operated only partially in a flood control mode. The Department makes sure that the operation plans for flood control dams are designed to optimize flood storage and to minimize downstream flooding. Dykes along the Bow River at Calgary, along the Red Deer River at Sundre and Drumheller, and along the Peace River at the Town of Peace River were designed and

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built by Alberta Environment to offer a measure of protection to urban development. However, dams, dykes and channel modifications are generally expensive to build and maintain, and do not provide complete protection. Lately, governments have begun to shift the emphasis in flood damage control away from costly structural solutions toward non-structural approaches such as flood risk mapping and zoning to discourage development in the floodplain.

Each of the above six components is designed to address different aspects of flood damage reduction and floodplain management. Over the long term, the preferred approach to floodplain management is the preventative one. By effective land use planning and regulation of development, problems relating to flooding can be prevented or minimized before they occur. This paper concentrates on the flood risk mapping and designation aspects of the preventative approach. Issues that need to be addressed to make the preventative approach more effective are posed at the end of this discussion.

FLOOD WARNING

Alberta Environment maintains a constant state of readiness to forecast the imminent occurrence of floods and to provide up-to-date information and forecasts. Information collected through a network of automatic data collection stations located in remote mountainous and hilly areas where rainfall generates the heaviest runoff, rainfall, snowpack and streamflow data is monitored continuously. Flood forecasts are prepared by analyzing the distribution of the rainfall together with prevailing temperature conditions, and comparing that with actual stream flow and water level measurements in storm-affected areas. If it is determined that a significant probability of imminent flooding exists, warnings are sent to a wide variety of agencies, including Alberta Public Safety Services, the news media and the municipalities which are expected to be affected by the flood. During this time, Alberta Environment maintains an around-the-clock operation to ensure that information is as up-to-date as possible, because such forecasts are essential to all activities designed to minimize flood damages and risk to life.

Flood forecasting has been optimized for major centres like Calgary where 12 - 18 hours of warning of an impending flood peak can be provided to the City of Calgary officials.

ICE JAM FLOODING

In Alberta, ice jams in rivers can cause severe flooding at breakup. This sudden damming of flow of water can quickly form valley lands into a reservoir. This type of flooding has occurred recently in Fort McMurray and Peace River. Other major locations that have had ice jam flooding in the past are Edmonton, Calgary, Rocky Mountain House, Whitecourt, Milk River, and Medicine Hat.

Alberta Environment maintains a regular program of river ice monitoring to forecast and manage ice jams, although with the current state of the science they cannot be predicted as confidently as we would wish. Special programs are run each year for Peace River and Fort McMurray. For Peace River, joint action with B.C. Hydro regarding flow control is necessary as the operation of the Bennett Dam can affect ice movement through Peace River. For Fort McMurray, close liaison is maintained with the city staff to warn them of any impending problems.

Ice jam mitigation measures such as blasting and dusting have been tried in the past by Alberta Environment. The assured effectiveness of such actions to relieve ice jams is questionable, but in cases of emergency these measures can be adopted by Alberta Environment to relieve ice jams.

FLOOD RISK MAPPING IN ALBERTA

Since the early 60s, Alberta Environment and its predecessors have maintained a program of mapping the urban flood-risk areas near water bodies. In Alberta, a flood-risk area is defined as that part of the floodplain which has a 1 percent or greater risk of being flooded in any year. Alberta Environment had flood risk maps ready for 42 communities by 1986. These maps were provided to municipal officials and land use planners for use in development planning and control.

CANADA - ALBERTA FLOOD DAMAGE REDUCTION PROGRAM

On April 3, 1989 Alberta signed an agreement with the government of Canada to enter into the Flood Damage Reduction Program (FDRP). This national program was started after the disastrous floods of 1974 and 1975, resulting in disaster payments of more than $100 million. The intent of this program is to reduce future flood damages in a mapped flood-risk area. These are the main features of this program:

Flood Risk Mapping And Designation:

Under this program, flood-risk areas in urban communities are identified, mapped and designated through the federal and provincial Ministers of Environment. The designation process involves the production of flood-risk maps and the enactment of certain government policies to encourage proper use of flood-risk areas, and thus discourage inappropriate use. The flood-risk mapping being prepared consists of two zones: floodway and flood fringe (Fig 1). This approach recognizes that certain areas of the floodplain are considered to be less hazardous than others, and development in these areas can occur safely. The flood fringe defines that portion of the floodplain where development may be permitted, subject to appropriate floodproofing. Floodproofing involves using measures such as elevation onfill, floodwalls or berms to protect buildings from flooding. The floodway defines that portion of the floodplain where flood waters are deepest and fastest. In this zone the only land uses recommended are parks, recreational areas, and other open space uses.

Designation And Government Policy:

Upon designation of a flood risk area, the following commitments by the two governments will be in effect:

- No new federal or provincial government buildings will be placed in the floodway zone.
- Financial assistance from federal and provincial government sources will no longer be available for new building in the floodway zone.
- All buildings in the flood fringe zone need to be adequately floodproofed.

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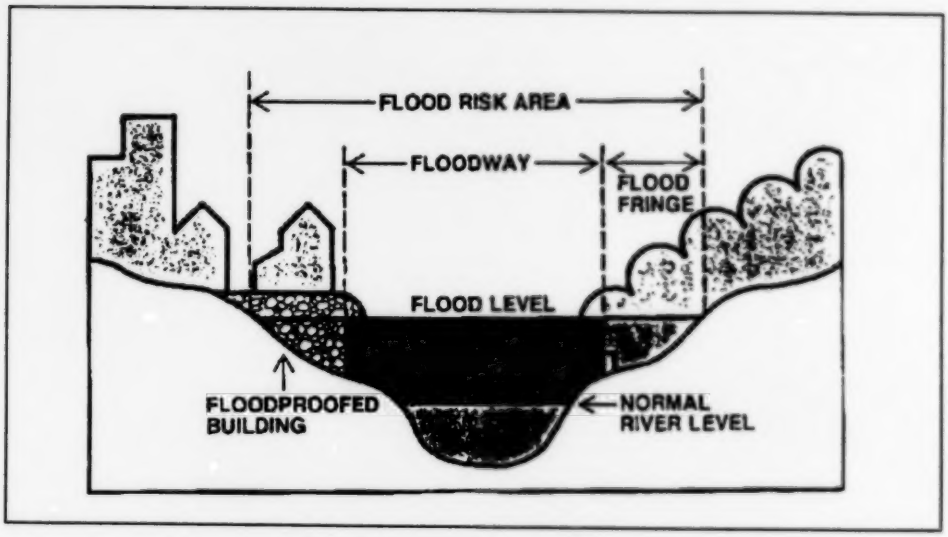
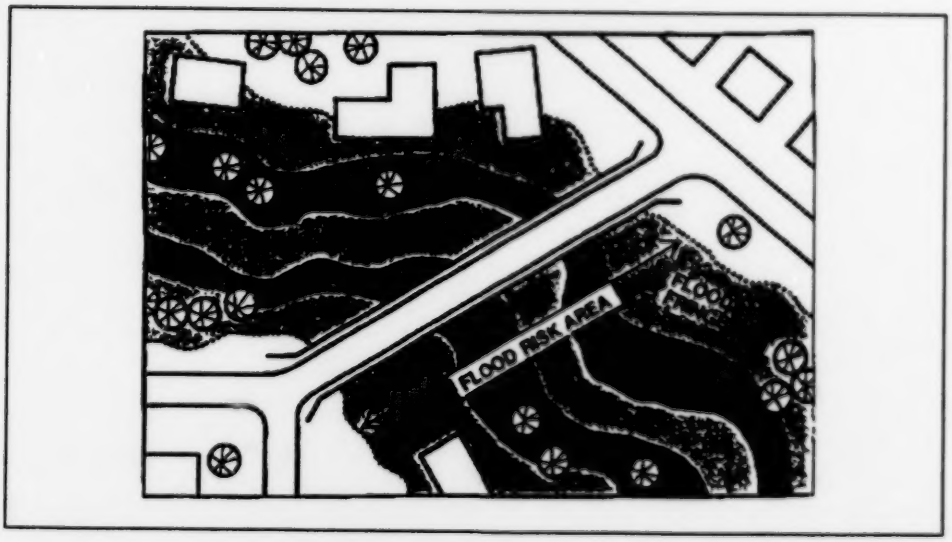
FIGURE 1: TWO ZONE MAPPING





- Any buildings or structures vulnerable to flood damage placed in a flood-risk area after designation will not be eligible for flood disaster assistance.

The provincial government will encourage local municipalities to adopt land use bylaws recognizing the restriction placed on new development by the designation of the flood- risk area.

With public awareness of the risks and costs involved in occupying areas prone to flooding, and through effective land use planning, problems relating to flooding can be prevented or minimized. The best way to avoid the financial toll of flooding is to discourage nonconforming developments in the designated flood risk area. Table 1 lists the communities planned for coverage under the FDRP.

DESIGNATION OF FLOOD CONTROL AREAS IN CURRENT LEGISLATION

The present ***Water Resources Act*** was expanded in 1960 to include management of flood-prone lands. Under Section 92, the Lieutenant Governor in Council, may by regulations designate as a flood control area any area considered to be in serious danger from flooding. Powers under this section allow the Minister to purchase or expropriate lands within a flood control area. The Minister is also empowered to regulate land use in a flood control area. The above provisions were designed to address flood control on specific flood-prone lands. The onus is on the Minister to order whatever action is appropriate for the designated flood control area.

ISSUES FOR CONSIDERATION

Current floodplain management in Alberta is done on the basis of trust between the municipalities and Alberta Environment. While Alberta Environment maps the flood-risk areas and supplies this information to the municipal authorities, implementation of land use controls to recognize the mapped flood-risk area is in the hands of municipalities. Municipal authorities, however, are also subject to the rulings of the Provincial Development Appeal Board on floodplains and other planning issues. The issue of legal liability is also paramount in the minds of some municipal officials who feel that, in the absence of legislative backup, the municipality is open to legal liability if it tries to enforce the mapped flood risk area.

Following are some suggestions which would facilitate management of flood risk areas in Alberta:

- All land use planning and resource management bodies within the Province should have regard for the implications of their actions respecting the creation of new, or the aggravation of existing, floodplain management problems.

- Municipalities and planning commissions should more fully recognize flood susceptibility in their land use planning process by showing and/or describing flood-risk lands in their official plans.

- Municipalities and planning commissions, in consultation with Alberta Environment, should include in their official plans, zoning and development policies which conform to the land use restrictions agreed to by the provincial and federal governments under the Flood Damage Reduction and Flood Risk Mapping Agreement.

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Such policies would ensure the following:

- new development in the floodway would be prohibited or restricted;
- new development that may be permitted in the flood fringe would have to be floodproofed;

TABLE 1

FLOOD DAMAGE REDUCTION PROGRAM
COMMUNITIES IDENTIFIED FOR FLOOD RISK MAPPING

Airdrie
Alix
Athabasca
Barrhead
Black Diamond/Turner Valley
Bragg Creek
Calgary
Camrose
Canmore
Carbon
Cardston
*Cochrane
Coleman/Blairmore/Frank
Didsbury
Drayton Valley
Drumheller
Eckville
Edmonton
Exshaw
Fort MacLeod
Fort McMurray
Fort Vermilion
Grande Prairie
High Prairie
High River
Hinton
Kinuso
Lacombe
Lamont
Lethbridge
Manning
Markerville
*Medicine Hat
Milk River
Millet
Okotoks
Paddle Prairie
Peace River
Penhold
Pincher Creek
Ponoka
Radway
Red Deer
Red Earth
Rochester
Rocky Mountain House
Rosebud
Rycroft
Sangudo
Slave Lake
*St. Albert
Stettler
Sundre
Thorsby
Two Hills
Walino
Whitecourt
Writing-On-Stone Park
Vegreville

* already designated

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